Manuscript SNCS-D-25-03808 for review

Expéditeur : SN Computer Science - Editorial Office (em@editorialmanager.com)

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Date : lundi 7 juillet 2025 à 02:45 UTC−4

Dear Dr. ALAHASSA,

In view of your expertise I would be very grateful if you could review the following manuscript which has been submitted to SN Computer Science.

Manuscript Number: SNCS-D-25-03808

Title: A Blockchain-Based Framework for Decentralized USIM Identity Management and Regulatory Compliance in Mobile Networks

Abstract: Traditional identity management systems in mobile network operator (MNO) environments face critical vulnerabilities to data breaches, fraud, and regulatory non-compliance due to their centralized architectures. This paper proposes a blockchain-based framework for enhancing USIM card security and fraud resistance in mobile network eco-systems through decentralized identity management and access control. We leverage Hyperledger Fabric as a permissioned blockchain platform integrated with the InterPlanetary File System (IPFS) for secure off-chain storage of encrypted Personally Identifiable Information (PII). Our architecture implements a dual-endorsement policy requiring validation from both MNOs and telecommunications Regulatory Authorities (RA) through smart contracts, ensuring transparent regulatory compliance while protecting user privacy. During subscriber onboarding, Know Your Customer (KYC) processes verify identity data, which is then hashed using SHA-256 and
securely referenced on-chain. Additionally, our framework enables real-time USIM deactivation through authenticated smart contract interactions. Performance evaluation using Hyperledger Caliper demonstrates the system's robust scalability, achieving throughput of up to 273.9 TPS with acceptable latency under high transaction loads. The experimental results validate our approach's effectiveness in addressing key challenges in mobile identity management: establishing trust, ensuring regulatory compliance, providing auditability, and enhancing user control while maintaining system performance under varying workloads.

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